A Review of new Technologies in Second Language Learning

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Abstract

Teaching second language is one of the most important issues that is paid attention to in the field of education. The second language, as one of the most important communication and social tools, has gained special importance in the current conditions of globalization and extensive developments in the field of business and industry. Teaching and learning the second language should be done with a cognitive approach, based on the different differences between the first and second languages. In this regard, the most important principle in teaching a second language is continuous practice. Also, the use of diverse methods focused on production and speaking and writing activities can accelerate the improvement and progress of students in learning a second language. The field of second language (L2) learning has witnessed a significant surge in the utilization of artificial intelligence (AI), which offers a wide range of advantages that can greatly enhance the language acquisition process. AI technology encompasses various applications such as chatbots, virtual tutors, speech recognition systems, language learning apps, and adaptive learning platforms. These advantages of AI in L2 learning provide learners with personalized and interactive experiences, real-time feedback, authentic language input, and the opportunity to practice language skills in a secure and supportive environment. By harnessing the potential of AI, language learners can benefit from tailored instruction, effective assessment, and engaging learning activities, ultimately expediting their proficiency in L2. This study aims to provide a review of AI in the English as a foreign language (EFL) context by summarizing the affordances and challenges associated with six prevailing types of AI technologies, including natural language processing (NLP), automatic writing evaluation (AWE), computerized dynamic assessment, automatic speech recognition (ASR), chatbots, gamification, and virtual reality. Some potential avenues for future research were also recommended to provide fresh perspectives for forthcoming studies.

Keywords: (AI), The Neurobiology of Language, Automatic speech recognition (ASR), Automatic writing evaluation (AWE).

Introduction

Some of the current issues in the field of language research include how language is organized in the brain, how we learn our first language (L1) as a child, whether we learn other languages (L2s) differently as we grow older, whether there are effects of critical or sensitive periods on our ability to learn language and on how we learn language, and how brain damage and atypical development affect language representation and processing. These issues are of interest to researchers in the fields of psychology, linguistics, education, neuroscience and speech language pathology, among others. In this chapter we hope to bring together research approaches and results from all of these f ields in the belief that it is only through cross-disciplinary collaboration that answers to language questions can be answered. As background we will first discuss how language is organized in the brain and then we will discuss the four main techniques that are being used today to investigate language processing in the brain. We will then proceed to discuss the research issues with a focus on neuroimaging evidence and the potential importance of this type of evidence for the field of educational linguistics.

The Neurobiology of Language

According to the classical view, language is represented in the left hemisphere of the brain (for the majority of people) and two main brain regions are specialized for language functions; Broca's area (located in the inferior frontal lobe) and Wernicke's area (located in the posterior temporal lobe). The evidence for this view came largely from studies of brain damaged patients with language deficits. In early studies autopsies following death showed that portions of the left hemisphere of the brain were damaged while right hemisphere areas were intact. In 1865, Broca concluded from his patients that the left frontal lobe is responsible for speech. These patients had difficulty with language production. The specific area described as the locus (the left inferior frontal gyrus) is now called Broca's area. In 1874, Wernicke described two patients with profound deficits in language comprehension. The damaged brain area for these patients was found to be in the posterior part of the superior temporal gyrus of the left hemisphere. This region is now known as Wernicke's area. These production and comprehension sites are connected via the arcuate fasciculus. Later studies using Computed Tomography and Magnetic Resonance have confirmed these earlier studies using living patients (for a review see Price, 2000). More recently, however, it has become clear that this view is too narrow for a full understanding of how language is processed in the brain. These new views come from advances in neuroimaging techniques. Instead of studying brain damaged patients, it is now possible to study language processing in the healthy human brain. In particular, it is now possible to see which areas in the brain normal volunteers activate while processing language by using haemo dynamic techniques and to determine when these processes are taking place by using electrophysiological techniques. Localization techniques, summarized below, have provided a lot of support for involvement of the classical areas in language processing; electrophysiological methods have confirmed that a number of clearly separable processes occur during language processing. However, many findings also strongly suggest that the classical model needs to be updated, as the functions assigned to the classical language areas have been oversimplified and many other areas contribute to normal processing [2].

The Neurobiology of First Language Acquisition

During typical first language (L1) development, a child is able to acquire, within a few years, the phonology, lexicon, and syntax of any natural language that they are exposed to. This is done without any explicit instruction. Understanding the development of language is very important from both a scientific and societal viewpoint. The overall level of language ability that is obtained by individuals has a profound impact on their success in many other aspects of life. Improving our understanding of normal language development and how to optimize it, as well as how to treat and help those with language development disorders or with atypical development, will greatly help society. Here we will discuss different levels of language acquisition from a neurodevelopmental perspective. In this section we will focus on typical language development and processing followed by a section on the effects of delayed exposure on language acquisition. Infants apparently come equipped at birth for the task of phonological acquisition with some perceptual processing biases which allow them to, among other things, discriminate both native and non-native phonetic contrasts. Within the first year, they show processing biases for well-formed syllables, the beginnings of word segmentation, and they are able to distinguish closed and open class words. During the first year of language development, following exposure to the ambient language, there is a progression from language general to more language-specific speech sound discrimination. This language general ability becomes refined as a function of listening experience, resulting in improved discrimination of native phonetic contrasts and poorer discrimination of non-native distinctions[2]. While much of the research leading to these conclusions has come from behavioral research, there is currently an influx of research at the neuroimaging level that supports these findings as well as adding more precise characterization of how phonological acquisition occurs. ERPs are also useful for investigating the finer points of the developmental trajectory, since they are relatively easy to collect from young children and continue to be measurable over a wider time range than most behavioral methods (e.g., high amplitude sucking and head turn paradigms). Recent ERP research suggests that the “decline” in non-native speech perception may actually not be a decline in discrimination of non-native phonemes, but rather an increase in neural responsiveness to native language speech sounds [6]. This suggests that the possible mechanism for “tuning in” to the native language may work by augmenting the linguistic distinctions in the environment rather than, as was thought based on the behavioural findings, that infants actually “lose” the ability to perceive differences in non-native speech contrasts. Infants clearly begin to acquire lexical knowledge within the first year of life. However, there is clear development in their sensitivity to phonological distinctions within words over the second year of life. Mills et al. (2004) demonstrated that 14-month-olds show clear N400-like responses to non-words as opposed to known words when the non-words are clearly distinct from the words. However, at 14 months, they do not distinguish known words from non-words which are phonologically very similar. This ability develops over the following months, with clear N400-like responses by the time the infants are 20 months old. By this age, children also show an N400-like effect to words which are semantically compatible with a picture context as opposed to incongruous with it [6].

Syntactic perception also begins within the first year. It has been shown that 1-year-olds are capable of recognizing patterns of co-occurrence within even a relatively small set of input (i.e., an artificial grammar), which suggests that they are capable of recognizing such dependencies in natural language as well [3]. The development of semantic and syntactic aspects of language proceeds over a much longer time than phonological perception. Children by around age 3 seem to have most of the language systems in place, in the sense that they in general produce lexical items in syntactically correct sequences, although learning will continue in both domains. However, that is not to say that their processing is completely adult-like even for those words and syntactic structures which they already know. The early effects discussed above differ considerably from the adult patterns in amplitude, latency, and sometimes even scalp distribution. In terms of the development of the N400 (which is sensitive to lexical and semantic processes), children show an adult-like pattern by age 6, though the onset of the effect continues to decrease with age, suggesting that processing becomes more efficient and less time-consuming 32 Laura . However, the development of syntactic processing seems to progress more slowly. At age 6, children do show a delayed reduced P600 effect to grammatical violations, but they do not yet reliably show the early negativity found in adult processing [4]. The early negativity has been linked to efficient automatized processes, while the P600 may reflect effortful integration (Kaan et al., 2000), which again suggests that the automatization of language processing requires time. It is still not clear when syntactic processing becomes completely adult-like. Language proficiency may depend heavily on the degree to which learners are able to automatize. Examining the course of the acquisition of linguistic processes may eventually provide an interesting diagnostic for educational purposes. This path is currently being investigated in a number of projects on early identification of dyslexia [1].

It is clear from the discussion above that language acquisition takes place in stages, with some indications that phonological development normally precedes lexical and semantic acquisition and with complete syntactic development lagging behind. One of the important issues about the neurobiology of language development is the relationship between brain development and language acquisition. It is clear that the human brain is by no means fully developed at birth. There is considerable development of the brain after birth, with dendrites developing at least up to 5 years and chemical processes until the end of puberty . Some systems are relatively well developed earlier than others; phonological processing may precede the other systems because it is relatively mature at birth. This suggests that the genetic predisposition for localization of functions within the brain and their developmental trajectory is central to the time course of language development. Conversely, language learning is frequently considered not to be as optimal after certain stages of brain development (critical or sensitive periods), just like the development of vision. The claim is that the brain becomes less plastic after some aspect of development is complete, so that late learning is less successful (sensitive period) or impossible (critical period). Since their developmental trajectories differ, it is possible that the different aspects of language have different sensitive periods. We will discuss this issue below. A third issue is the extent to which the presence of input determines brain development. fortunate case of deaf children that were unable to typically acquire a f irst language, language may not be available at all within the sensitive period. There is both lesion and ERP evidence consistent with a critical link between input and brain development

[7]. The early lesion evidence also argues for a developmentally limited neural plasticity; early damage does have n. Second language acquisition (SLA).

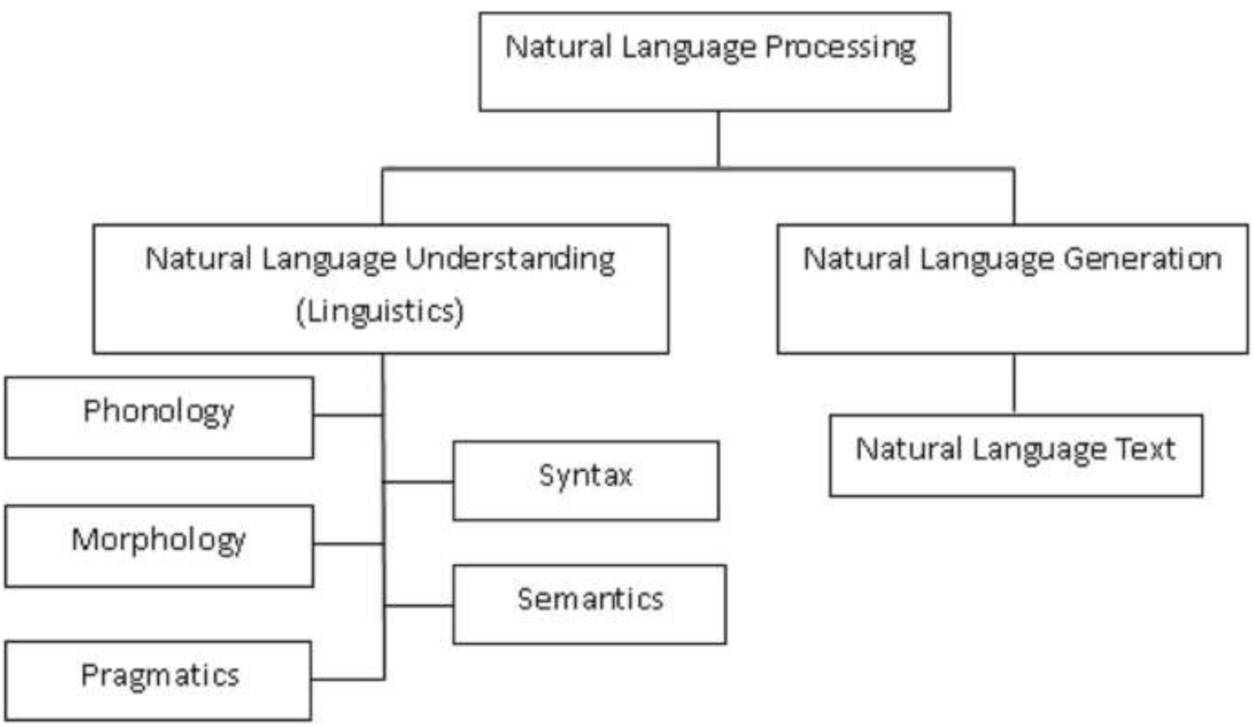
These days more and more of the world's population are learning second and foreign languages later in life, and knowing how the brain deals with this type of linguistic input would ideally help in focusing programs of language training. Compared to L1 acquisition, L2 acquisition rarely results in native-like f luency, possibly due to sensitive period effects. An alternative is that L1 interferes with L2 learning and leads to a less optimal result. Simply investigating the off-line language behavior of L2 speakers cannot decide between these two hypotheses. Using neuroimaging techniques that can tell us when and where language processing is occurring will bring us closer to answering this question. This research area has produced very inconclusive results so far. Part of the complexity in determining whether L1 and L2 make use of the same neural resources is due to the difficulty in disentangling the effects of age of acquisition, level of proficiency, (dis)similarity between the L1 and L2, and whether the L2 was learned in a naturalistic manner or in a classroom. Adding to this difficulty is the fact that all of these effects are graded. Despite these difficulties there are some trends in the research. We will start with adult SLA, as it is clear that this group has acquired the L2 after any proposed sensitive period. Recent reviews of language localization studies suggest that the normal language areas, including Broca's and Wernicke's, are also used to process L2. Thus it does not seem likely that totally different learning mechanisms are employed in SLA, which might have been predicted by a version of the critical period hypothesis in which the learning mechanisms cease to be available at all after a certain stage of brain development. This seems to be true independent of age of acquisition, and largely independent of proficiency as well. However, L2 does appear to lead to quantitatively more activation in some of these areas, which under the logic of this sort of experiment suggests that the areas need to work "harder" to deal with L2. Under a different version of the sensitive period hypothesis we might argue that the regions of the brain that are optimally suited for language processing have been optimized for L1 processing during the sensitive period and thus are less available and less efficient for L2 processing. Such a view is consistent with needing to acquire input during a sensitive period in order to optimize processing, but is also a specific version of the L1 interference hypothesis.

the vertical spread of computer-assisted language learning (CALL), i.e., a spread throughout language materials and curricula, makes it difficult to draw a clear distinction between CALL and other language materials. In view of the emphasis that teachers, researchers, and administrators have placed on evaluating CALL, I argue that some valuable lessons about materials evaluation can be drawn from reflection on issues in CALL evaluation. In particular, I discuss the opportunities for professionals to reconsider assumptions held about comparative research, draw upon research perspectives and methods from applied linguistics in materials evaluation, and include critical perspectives which examine the opportunities that materials offer language learners to engage in language and culture learning.

The emergence of computer-assisted language learning (CALL) has rapidly transformed the landscape of second language (L2) learning. Using machine learning algorithms, techniques for processing natural languages, and big data analysis, artificial intelligence (AI) technologies have gained the capacity to revolutionize the ways in which we acquire and master a new language. These advancements have paved the way for interactive chatbots, virtual language tutors, and intelligent language assessment tools that possess the ability to comprehend and respond to the unique needs of learners. AI-powered platforms can offer personalized learning experiences that are tailored to an individual's proficiency level, learning style, and goals. This personalized approach not only enhances motivation but also optimizes learning outcomes by delivering targeted content and adaptive feedback. By incorporating AI, language learners can benefit from an immersive and interactive learning environment that replicates real-life situations and encourages practice and fluency. AI can facilitate the integration of speech recognition, automated translation, and natural language generation, thereby increasing the accessibility and efficiency of language learning across different contexts and proficiency levels.

Evaluation metrics Natural language processing (NLP)

Natural language processing (NLP) has recently gained much attention for representing and analyzing human language computationally. It has spread its applications in various fields such as machine translation, email spam detection, information extraction, summarization, medical, and question answering etc. A language can be defined as a set of rules or set of symbols where symbols are combined and used for conveying information or broadcasting the information. Since all the users may not be well-versed in machine specific language, Natural Language Processing (NLP) caters those users who do not have enough time to learn new languages or get perfection in it. In fact, NLP is a tract of Artificial Intelligence and Linguistics, devoted to make computers understand the statements or words written in human languages. It came into existence to ease the user’s work and to satisfy the wish to communicate with the computer in natural language, and can be classified into two parts i.e. Natural Language Understanding or Linguistics and Natural Language Generation which evolves the task to understand and generate the text. Linguistics is the science of language which includes Phonology , Morphology word formation, Syntax sentence structure, Semantics syntax and Pragmatics which refers to understanding. Noam Chomsky, one of the first linguists of twelfth century that started syntactic theories, marked a unique position in the field of theoretical linguistics because he revolutionized the area of syntax (Chomsky, 1965) [23]. Further, Natural Language Generation (NLG) is the process of producing phrases, sentences and paragraphs that are meaningful from an internal representation. The first objective of this paper is to give insights of the various important terminologies of NLP and NLG [5]. producing phrases, sentences and paragraphs that are meaningful from an internal representation. The first objective of this paper is to give insights of the various important terminologies of NLP and NLG. In the existing literature, most of the work in NLP is conducted by computer scientists while various other professionals have also shown interest such as linguistics, psychologists, and philosophers etc. One of the most interesting aspects of NLP is that it adds up to the knowledge of human language. The field of NLP is related with different theories and techniques that deal with the problem of natural language of communicating with the computers. Few of the researched tasks of NLP are Automatic Summarization (Automatic summarization produces an understandable summary of a set of text and provides summaries or detailed information of text of a known type), Co-Reference Resolution (Co-reference resolution refers to a sentence or larger set of text that determines all words which refer to the same object), Discourse Analysis (Discourse analysis refers to the task of identifying the discourse structure of connected text i.e. the study of text in relation to social context),Machine Translation (Machine translation refers to automatic translation of text from one language to another),Morphological Segmentation (Morphological segmentation refers to breaking words into individual meaning-bearing morphemes), Named Entity Recognition (Named entity recognition (NER) is used for information extraction to recognized name entities and then classify them to different classes), Optical Character Recognition (Optical character recognition (OCR) is used for automatic text recognition by translating printed and handwritten text into machine-readable format), Part Of Speech Tagging (Part of speech tagging describes a sentence, determines the part of speech for each word) etc. Some of these tasks have direct real-world applications such as Machine translation, Named entity recognition, Optical character recognition etc. Though NLP tasks are obviously very closely interwoven but they are used frequently, for convenience. Some of the tasks such as automatic summarization, co-reference analysis etc. act as subtasks that are used in solving larger tasks. Nowadays NLP is in the talks because of various applications and recent developments although in the late 1940s the term wasn't even in existence. So, it will be interesting to know about the history of NLP, the progress so far has been made and some of the ongoing projects by making use of NLP.



Natural language processing (NLP) is the aspect of Al that allows computers to understand spoken words and written text. NLP is arguably the most commonly used AI as it’s intertwined in many of today’s digital assistants, virtual assistants, and spam detection. NLP is also used to generate sentiment analysis, which analyzes texts and extracts the emotions and attitudes about a product or service. Natural Language Processing (NLP) is an area of research and application that explores how computers can be used to understand and manipulate natural language text or speech to do useful things. NLP researchers aim to gather knowledge on how human beings understand and use language so that appropriate tools and techniques can be developed to make computer systems understand and manipulate natural languages to perform the desired tasks. The foundations of NLP lie in a number of disciplines, viz. computer and information sciences, linguistics, mathematics, electrical and electronic engineering, artificial intelligence and robotics, psychology, etc. Applications of NLP include a number of fields of studies, such as machine translation, natural language text processing and summarization, user interfaces, multilingual and cross language information retrieval (CLIR), speech recognition, artificial intelligence and expert systems, and so on. New technologies open great possibilities, they radically change the natural world and improve human life. In order to get more comfort, people started designing various devices with different features. With recent advances in information technology, natural language processing has made things easier and more practical in many fields. Nowadays, especially when big data is used in most researches, natural language processing provides easy and fast ways to process these data. Natural language processing is a computer approach to analyzing texts based on a set of theories and technologies. Although natural language processing is a relatively new field of research and application, compared to other information technology approaches, the successes achieved so far show that information access technologies based on natural language processing are still a major area of research and development in Information systems in the present time and will be in the future [3]. Researchers in the field of natural language processing play an important role with the aim of gathering knowledge on how humans understand and use language so that appropriate tools and techniques are able to develop computer systems in order to recognize and manipulate natural language in order to perform the intended tasks. Natural language processing is included in many fields, including computer science and information science, linguistics, mathematics, electronic engineering, artificial intelligence, and robotics. The applications of natural language processing include fields of study such as machine translation, summarization and processing of natural language texts, user interface, multilingual and interlingual information retrieval, speech recognition, artificial intelligence and expert systems.The topic of artificial intelligence is the hottest debate among computer science and information technology experts and other scientists. Artificial intelligence is a branch of computer science that deals with the ability of computers to simulate various aspects of intelligence, including voice recognition, reasoning, creative response, the ability to learn from previous experiences, and the ability to draw conclusions from incomplete information. Artificial intelligence seeks to build computer systems (hardware and software) that behave like humans. If artificial intelligence reaches its goals, it will be a big leap in the way of human being to achieve more prosperity and more wealth. These systems are based on human knowledge, experience, and thought patterns, and they are like books or other human intellectual works that do not contain any information until they are written. LISP, PROLOG programming languages are among the most important languages used in artificial intelligence. The syntactic and semantic characteristics of these languages have made them provide powerful methods and solutions for problem solving. PROLOG is a logical programming language. In this language, an interpreter writes the program based on a logic LISP (List Processor) is the first functional programming language: it was designed to support symbolic computations using linked lists as the central data structure. Artificial intelligence is divided into a number of subfields and tries to create systems and methods that mimic the intelligence and logic of decision makers. The three main branches of artificial intelligence are: 1. Expert systems 2. Robots 3. Language processing [5]. A wealth of L۲ empirical studies has documented how NLP contributes to learning different L۲ aspects, including collocations , listening grammar, and sentence production . The positive impacts of using intelligent tutoring systems and how they cope with input and generate output were reported by numerous studies [6].

Murray and Perez (۲۰۱۵) implemented an adaptive feedback mechanism within the assessment system. Their study demonstrated that this system outperformed the traditional learning system in terms of efficiency. In another study, Mitrovic et al. (۲۰۱۳) utilized intelligent tutoring tools to rectify misconceptions. It was suggested that intelligent tutoring systems, which primarily focus on addressing errors and misconceptions, could be further enhanced by incorporating a positive feedback feature. The empirical assessment revealed that students who engaged with the augmented edition of the tutor, which provided negative and positive feedback, acquired knowledge at a rate twice as fast as those students who interacted with the standard version that only provided error feedback. More recently, Demir (۲۰۱۹) argued that AI-based tutors can seize exceptional teaching opportunities by harnessing negative feedback that emerges from errors. These opportunities allow for a deeper understanding of an individual's capabilities, thereby improving problem-solving skills, knowledge specialization, and facilitating learning at advanced levels. Text-to-speech and speech-to-text systems have been also found to facilitate language learning, enabling learners to improve their speaking and listening skills. A further affordance of NLP technology is machine translation which provides learners with real-time translations, simplification of complex sentences, and explanations of idiomatic expressions (Lee, ۲۰۲۰). NLP models are also able to provide contextually relevant suggestions for completing sentences or selecting appropriate lexicon, thus helping learners improve their lexicon, writing, and communication skills [10].

Automatic writing evaluation (AWE)

Traditionally used solely for assessment purposes, automated writing evaluation (AWE) technologies have increased their popularity as an aid in the second language (L2) writing classrooms, especially in the last decade. In addition to the feedback capabilities of AWE and its effect on L2 writing quality, an increasing number of naturalistic, classroom-based studies have demonstrated that L2 students' engagement with these systems is complex and multi-layered, requiring an in-depth understanding. In this regard, a critical interpretative synthesis of existing literature on student engagement with AWE in L2 classrooms is warranted. Adopting grounded theory (Glaser & Strauss, 1967) as the guiding methodology, this study surveys and synthesizes the findings of 40 focal studies, published primarily between 2013 and 2021 in the context of second and foreign language. The prominent emergent themes that this synthesis yielded are a) impact of AWE on L2 students' writing practices, (b) impact of individual and contextual factors on students' AWE engagement, (c) impact of AWE on teacher feedback in L2 writing classrooms, and (d) limitations elicited in AWE classroom research. Based on this synthesis, the study provides a possible research agenda and suggests practical implications for AWE.

Technological advancements have enabled AWE systems to support writing improvement in instructional settings beyond high-stakes assessment contexts .Consequently, automated scoring systems have been supplemented with instructional tools for classroom use, such as model essays, graphic organizers, dictionaries, and spelling and grammar checkers [20] . Despite calls for research existing literature has not fully addressed how AWE systems are implemented in L2 writing classrooms. This is particularly consequential given the growing integration of technology in L2 instruction and assessment, coupled with the unique challenges faced by L2 writers . There is thus a critical need to scrutinize how AWE tools are being adopted and adapted in these educational settings. Addressing this gap, the current study undertakes a comprehensive synthesis of 40 research studies from 2013 to 2021 on the use of AWE in L2 writing classrooms by adopting the grounded theory (GT) method [10].

There are two different types of AWE systems: machine-scoring engines based on English-scoring engines and machine-scoring engines based on languages other than English . These two categories primarily differ in the design and development of the scoring engines, which involve different methodologies, linguistic resources, and computational techniques, which contribute to their unique characteristics and capabilities. Several recent research studies have also explored the effectiveness of AWE tools in supporting the psychological aspects of L۲ learning, thus enhancing the writing abilities of L۲ learners. In a study by Yao et al. (۲۰۲۱), the students were randomly divided into experimental and control groups. Both groups were provided with English writing instructions based on the syllabus [18]. However, only the students in the experimental group participated in three peer assessment activities, which were facilitated by an AWE program. The outcomes revealed that the students in the experimental group exhibited a greater inclination towards using L۲ and sustained a high level of motivation throughout the study. These findings imply that the integration of AWE can serve as a valuable addition to peer assessment activities in L۲ writing classrooms, fostering a more positive mindset among students [7].

Automatic speech recognition (ASR)

Automatic speech recognition (ASR) is one of the ways used to transform acoustic speech signals into text. Over the last few decades, an enormous amount of research work has been done in the research area of speech recognition (SR). However, most studies have focused on building ASR systems based on adult speech. The recognition of children's speech was neglected for some time, which means that the field of children's SR research is wide open. Children's SR is a challenging task due to the large variations in children's articulatory, acoustic, physical, and linguistic characteristics compared to adult speech. Thus, the field became a very attractive area of research and it is important to understand where the main center of attention is, and what are the most widely used methods for extracting acoustic features, various acoustic models, speech datasets, the SR toolkits used during the recognition process, and so on. ASR systems or interfaces are extensively used and integrated into various real-life applications, such as search engines, the healthcare industry, biometric analysis, car systems, the military, aids for people with disabilities, and mobile devices. A systematic literature review (SLR) is presented in this work by extracting the relevant information from 76 research papers published from 2009 to 2020 in the field of ASR for children. The objective of this review is to throw light on the trends of research in children's speech recognition and analyze the potential of trending techniques to recognize children's speech. In recent decades, remarkable progress has been accomplished in developing functional spoken dialog systems and automatic speech recognition (ASR) systems, and both are utilized in different applications. Several techniques have been proposed by researchers to improve the performance and recognition accuracy of ASR systems but these are mainly focused on speech recognition in adult speakers. According to the studies, the ASR system's efficiency is lower when it is tested using children's speech; this finding directed attention toward the area of more robust ASR systems for interpreting children's utterances. Introducing suitable amounts of children's speech data for training the system is one way of improving children's speech recognition. However, the majority of public data sets are compiled with the assistance of adult speakers[19] . Collecting a children's speech corpus for training the ASR system is difficult and the data sets are usually smaller than the adult corpus. Acoustics and linguistic properties such as the spectral and temporal features of adults and children are also different. As a result of the variance in these characteristics, there is a mismatch between children's and adult speech. The main reason behind these differences is the morphological and anatomical variabilities in the vocal tract and the fact that children have less control over prosodic features such as pitch, power, rhythm, and intonation. Various speaker normalization and adaptation techniques have been proposed to date, to reduce the mismatches. Thus, another method to improve children's speech recognition is by reducing the size of the acoustic mismatch between adults' and children's speech by applying different algorithms. Thus, due to a limited data set and differences in acoustic and linguistic properties, recognizing children's speech remains one of the most challenging parts of the ASR system [8].

ASR technology offers several key advantages in language learning, particularly in terms of providing real-time feedback on pronunciation and speech accuracy. By speaking into a microphone, learners can receive immediate feedback from the ASR system, which analyzes their speech patterns, identifies errors, and offers suggestions for improvement. This instant feedback is invaluable for learners as it allows them to practice and enhance their pronunciation, intonation, and overall speaking skills. Moreover, ASR technology can facilitate interactive conversations between learners and AI systems. These dialogues provide learners with a controlled and supportive environment to practice their listening and speaking skills (Yu & Deng, ٢٠١٦). The AI system accurately transcribes learner responses, offers suggestions for vocabulary and grammar enhancements, and provides targeted exercises tailored to individual learning needs. ASR technology can seamlessly integrate with language learning platforms and mobile applications , enabling learners to practice their speaking and listening skills anytime and anywhere. Learners can record their speech, compare it with the ASR-generated transcript, and evaluate their performance. This self-assessment capability empowers learners to take charge of their learning progress and monitor their advancements over time [3]. ASR technology in the context of L٢ acquisition has its limitations. The accuracy of ASR systems is significantly influenced by variables such as the learner's native language background, accent, and speech quality. Consequently, individuals with non-standard accents or speech patterns may face challenges in obtaining precise feedback. Additionally, ASR systems may encounter difficulties in accurately capturing the intricacies of pronunciation or context-specific speech [3].

A software tool

Artificial intelligence chatbots recently caused a stir in the world by promising to transform education systems in a multitude of way. A chatbot is a software tool that interacts with users on a certain topic or in a specific domain in a natural, conversational way using text and voice. For many different purposes, chatbots have been used across a wide range of domains, including marketing, customer service, technical support, as well as education and training. Current developments in this area suggest that interaction with technologies, either by natural language or by speech, is possible because technology develops, and users become more used to interacting with digital entities. Rather than creating a human-like smart machine application, it is about creating effective digital assistants who are able to provide information, answer questions, discuss a specific topic, or perform a task. Today, the chatbot landscape is wide. Chatbots are not associated as a single category but they fall along a wider spectrum. Chatbots have the potential to greatly contribute to the process of learning an L٢. They offer learners a controlled and supportive environment where they can actively practice and enhance their language skills. Designed to engage in conversations, chatbots make excellent practice partners for language learners. By interacting with chatbots, learners can actively practice speaking, listening, and comprehending the target language. A further notable advantage of chatbots is their ability to provide learners with instant feedback [4]. This immediate feedback is helpful in helping learners identify and rectify their mistakes promptly, facilitating continuous improvement in their language proficiency. Chatbots can offer exercises, quizzes, and prompts that assist learners in solidifying their understanding of various linguistic aspects. They can adapt to learners' individual needs and deliver tailored language lessons based on their current skill level and learning objectives. This personalized approach enhances the effectiveness and engagement of language learning [4]. This technology creates a secure and non-judgmental space for learners to practice speaking without the fear of embarrassment or making mistakes .This supportive environment helps learners build confidence and overcome any hesitations they may have in utilizing the target language. Chatbots can offer learners valuable insights into the culture associated with the target language. They can provide information about customs, traditions, and local idioms, enriching learners' cultural competence alongside their language proficiency [14]. Studies have also demonstrated the effectiveness of chatbots in enhancing English conversational skills. Research indicates that individuals who interact with chatbots during conversational exercises exhibit improved speaking and listening abilities[12].

Recent research has also shed light on the efficacy of chatbots in promoting autonomous learning in the acquisition of second languages. Learners have the convenience of accessing chatbots at any time and from any location, enabling them to learn at their own pace and engage in independent practice. Moreover, as chatbots offer personalized materials and adaptive exercises that cater to the specific needs of each learner, they can cultivate a sense of ownership and motivation in the learning. Notwithstanding the affordances associated by AI-based chatbots, it is worth noting that they are also subject to certain limitations. Primarily, chatbots heavily rely on pre-programmed responses, which restricts their adaptability to cater to a wide range of learner needs and language variations . They may encounter difficulties in comprehending and accurately interpreting complex language structures, idiomatic expressions, and cultural nuances [16]. Furthermore, chatbots lack the capability to provide valuable feedback on pronunciation and intonation, which are vital aspects of language learning. Additionally, chatbots may struggle to grasp the contextual understanding required for effective language instruction, and they may face challenges in engaging learners in authentic and interactive conversations. These limitations emphasize the significance of incorporating diverse resources and opportunities for language practice and instruction[20].

conclusion

In order to enhance the overall learning experience for students, it is imperative that teachers and educators receive professional training to effectively utilize AI technologies in second language learning classes. The potential of AI technologies to assist language learning is immense. However, the successful integration of these technologies requires well-trained teachers who possess a comprehensive understanding of how to leverage AI tools to support pedagogical goals and adapt them to various learning contexts [20]. It is essential for teachers to undergo training that equips them with the necessary skills to navigate and fully utilize AI technologies, ensuring that they can create engaging and interactive language learning experiences for their students. Additionally, educators should be trained to comprehend the ethical implications and potential biases associated with AI systems, enabling them to make informed decisions regarding the implementation and use of these technologies in the classroom [18]. As argued by Pradana (۲۰۲۳), It is imperative for the education sector to strike a delicate balance between harnessing the power of AI to enhance the educational experience and preserving the essential human touch and interpersonal communication that are crucial for effective knowledge transfer[18].

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